

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH  
THIS INFORMATION COLLECTION REQUEST: 50.0 HRS.  
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO  
THE INFORMATION AND RECORDS MANAGEMENT BRANCH  
(MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION,  
WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK  
REDUCTION PROJECT (3150-0104), OFFICE OF  
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Indian Point 3	DOCKET NUMBER (2) 05000286	PAGE (3) 1 OF 6
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TITLE (4) Discovery of a Design Deficiency in the DC Power System That Causes Inadequate Emergency Power Due to a Postulated Single-Failure During Use of a Backup Battery Charger Resulting in the Plant Being Outside Design Basis

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	13	97	97	-- 003 --	00	04	14	97	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)						
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER						
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)							
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)							

## LICENSEE CONTACT FOR THIS LER (12)

NAME Tom Klein, Manager Design Electrical Engineering	TELEPHONE NUMBER (Include Area Code) 914-736-8879
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## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

## SUPPLEMENTAL REPORT EXPECTED (14)

<input checked="" type="checkbox"/> YES August 15, 1997 (If yes, complete EXPECTED SUBMISSION DATE).	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 13, 1997, with the plant at 100 percent power and normal temperature and pressure, operations reported the plant outside design basis as a result of an engineering determination that there was a design deficiency in the 125 volt DC Electrical Distribution System (EDS) power supplies due to an inability of the system to meet single failure criteria during use of a backup battery charger (BC). The reported condition existed periodically since a design modification added a backup battery charger (BC) 35 to the 125 volt DC EDS and powered it from a 480 volt AC bus that is supplied from one of three Emergency Diesel Generators (EDG) 33. When BC-35 is used in lieu of a normal charger to sustain the DC power supply supporting one of the other two EDGs, a Loss of Offsite Power or Safety Injection and a postulated single failure to EDG-33, or its associated bus/power circuit could result in loss of two BCs. Subsequent battery depletion could result in loss of one of the two remaining EDGs due to a shunt of its DC field excitation caused by the loss of DC power to a field shunt relay. The design of the onsite emergency AC power system requires a minimum of two EDGs so the potential loss of two of three EDGs places the plant outside its design basis. The event was caused by the original classification of BC-31, 32, 33 as non-safety which was relied upon for the modification to add BC-35 and resulted in no consideration of cross-tie effects. Corrective actions include issuing a hold-off to prevent the use of the BC-35, document BC re-classification to seismic Class I/QA Category I, further assess the cause, safety significance, extent of condition, and the adequacy of the DC system. This event had no significant effect on the health and safety of the public.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Note: The Energy Industry Identification System Codes are identified within the brackets { }

**DESCRIPTION OF EVENT**

On March 13, 1997, at approximately 1650 hours, Operations concluded that past operation of the backup battery charger {BYC} (BC) could place the plant outside its design basis and made a one-hour non-emergency notification (Log No. 31948) to the NRC at approximately 1746 hours. At the time of the event, the plant was at 100 percent reactor power, Reactor Coolant System (RCS) temperature at approximately 567 degrees F, RCS pressure at approximately 2235 psig, and pressurizer level at approximately 46 percent. The Operations determination was based on an evaluation of Deviation Event Report (DER) 97-0521, written by Design Engineering to identify that there was a design inadequacy in the 125 volt DC Electrical Distribution System (EDS) {EJ} that is due to an inability of the system to meet single failure criteria during use of a backup battery charger. While evaluating this issue, engineering also identified that normal battery chargers (BC) 31, 32, 33 were not safety related but should have been.

Power is supplied to 125 volt DC instrumentation and control loads {EE} by the 125 volt DC EDS which normally receives power from the 480 volt AC EDS {ED} to the 125 volt DC EDS via the battery chargers. The 125 volt DC EDS consists of four independent power panels each of which is provided with a dedicated battery {BTRY} and battery charger. Batteries 31, 32, 33 and 34 are charged from battery chargers 31, 32, 33, 34, respectively, which are in turn powered from 480 volt safeguards buses {BU} 5A, 6A, 2A and 3A. Buses 2A and 3A are tied together and considered a single safeguards bus. The charger functions to supply continuous DC bus loads while recharging the battery during normal and accident conditions. In the event that the 480 volt AC EDS is lost, the batteries are sized to supply its expected shutdown loads following a plant trip and loss of AC power for at least two hours. A backup charger (BC-35) was added in 1985. Engineering discovered that during the times BC-35 is used as a substitute for either BC-32 or BC-33, a Loss of Offsite Power or a Safety Injection signal and a postulated single failure of EDG-33, or its associated 480 volt bus/power circuit may cause loss of DC power input (via the backup battery charger) to a second EDG. Engineering's investigation found that this could lead to loss of the second EDG after depletion of its battery. Although the EDGs are self exciting (except during startup), a field shutdown circuit of the EDG exciter regulators contains a relay (K1) {RLY} that is powered by an external DC power source (the associated battery).

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Upon loss of battery power (designed for at least two hours with no battery charger available), de-energization of the K1 relay in the EDG exciter regulator would cause loss of EDG output. In addition, as a result of further investigation Engineering also concluded that because BC-31, 32, and 33 are not safety related, they could not be credited with performing their function following a Loss of Offsite Power (LOOP). Therefore, the EDGs could be lost following depletion of the battery power.

BC-31, 32, 33, 34, and 35 are manufactured by Exide Corporation {E353}. BC-31, 32, and 35 are model number SCRF 130-3-400-E; BC-33 is model number USF 130-3-200, and BC-34 is model number USF 130-3-150.

**CAUSE OF EVENT**

The event was caused by classification of battery chargers 31, 32, and 33 as non-safety related during the original design. This non-safety design basis was relied upon for the modification that added BC-35 therefore the effects of the cross-tie were not evaluated.

**CORRECTIVE ACTIONS**

The following corrective actions have been or will be performed to address the causes of this event:

- A Protective Tagging Order was issued to prevent the use of the backup battery charger.
- An Operational Shift Order was issued notifying operators of the problem with the BCs, use of BC-35, procedural changes required for returning the power to the BCs within two hours, and the DC requirement of the EDGs. Issued April 2, 1997.
- DER 97-0643 was initiated in accordance with a design engineering directive for a technical evaluation upgrade of the QA classification of BC-31, 32, and 33 to QA Category I. Per AP-8 operations was advised for consideration of operability/reportability. Operations concluded that BC-31, 32, 33 are operable based on engineering's assessment (seismic qualification using the SQUG methodology and engineering's judgement of the chargers quality condition).

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- Operations will revise the appropriate procedures to provide a note to alert operators that the batteries have a two hour design limit and that EDG output could be lost due to an externally powered DC shunt circuit in the EDG exciter regulator controlling field excitation. Scheduled completion is July 31, 1997.
- Update the Plant Equipment Data Base (PEDB) to reflect the BC classification upgrade. Scheduled completion is July 31, 1997.
- LER 97-003 will be supplemented to identify the cause of the non-safety classification of BC-31, 32, and 33 and to assess the safety significance and extent of condition, including an assessment of the modification which installed BC-34, battery 34, and associated circuits to determine if an upgrade is necessary. Scheduled completion is August 15, 1997.

**ANALYSIS OF EVENT**

The condition is being reported under 10 CFR 50.73 (a)(2)(ii)(B). The licensee shall report any operation or condition that resulted in the plant being in a condition that was outside the design basis of the plant. The condition is being reported because the onsite emergency AC power supply, which is designed to have a minimum of two Emergency Diesel Generators, could have been less than the minimum during past use of the non-safety related backup battery charger (BC-35), or as a result of non-safety grade battery chargers that can not be credited in a DBA/DBE.

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During past maintenance when the backup battery charger (BC-35) has been used in place of BC-32 or BC-33, a Loss of Offsite Power or a Safety Injection signal and a postulated single failure of EDG-33, or its associated 480 volt bus/power circuit would cause loss of the battery charger that would result in battery depletion and a consequential loss of the associated EDG. This condition has existed since installation of BC-35 in 1985 whenever BC-35 was in use. The potential loss of more than one battery charger and their lack of qualification as safety related components and subsequent loss of all EDGs is a condition that has existed since the original plant operation.

A review of Licensee Event Reports (LERs) over the last three years for similar events concerning inadequate designs for single failure identified the following LERs: LER 96-001, 95-015-03, 95-007, 95-003.

**SAFETY SIGNIFICANCE**

This event did not have a significant effect on the health and safety of the public. There was no actual safety significance because there was no loss of DC power nor any design basis accidents (DBAs) or earthquake with loss of offsite power (LOOP). There have been two LOOPs events since backup battery charger 35 was installed in 1985. One LOOP occurred in February 1995 (LER 95-004) and another occurred in January 1996 (LER 96-002). Both LOOPs occurred during cold shutdown. A review of the operating history and plant log showed that during the LOOP in 1995, BC-35 was substituted for BC-34. However, BC-34 does not support an EDG and there are existing procedures to re-power instrument bus 34 by operator actions from safeguards MCC-36B or MCC-36C. During the LOOP in 1996, BC-35 was not being used. The individual battery chargers would have been reloaded using System Operating Procedure (SOP)-EL-15, "Operation of Non-Safeguards Equipment during Use of the Emergency Operating Procedures (EOPs)." Procedure SOP-EL-15 does not have a time limit to re-energize MCC's 32, 37 or 39, but the test time for operators on the Job Performance Measure (JPM) exam for align and reset of MCCs and lighting without offsite power is 20 minutes. Therefore, reset and energization of the MCCs is expected to occur within 2 hours.

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The potential safety significance for design basis conditions were assessed as follows:

- Battery Chargers 31, 32, 33 would have performed their function. BCs 31, 32, 33 have been determined to be operable by operations based on a SQUG evaluation and engineering input. Therefore, the chargers would not have failed in design basis events.
- Each of the four batteries were sized to carry its expected shutdown loads following a plant trip and loss of all AC power for a period of two hours and the battery chargers would be reloaded by operations for continued DC power. Without MCC-32, BC-34 could not be powered, but the load for battery 34, instrument bus 34 can be re-powered by operator action using established procedures from MCC-36B or MCC-36C.

A probabilistic calculation regarding the frequency of a LOCA with LOOP and a single failure of the 33 EDG determined that the frequency for this event was  $6.68\text{E-}7$  per year, and its associated Core Damage Frequency (CDF) is  $4.94\text{E-}9$  per year. The CDF per year is less than  $2\text{E-}6$  which is a level of probability considered to present no significant effect to public health and safety.